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X-ray wakefield acceleration in a nanotube[1] XIAOMEI ZHANG, University of California, Irvine; Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, TOSHIKI TAJIMA, DEANO FARINELLA, University of California, Irvine, YONGMIN SHIN, Northern Illinois University, Fermilab, GERARD MOUROU, JONATHAN WHEELER, Ecole Polytechnique,France, PETER TABOREK, University of California, Irvine — Electrons can be accelerated to high energies in the wakefield when a short pulse laser or beam passes through a plasma [1]. Experiments have shown that the GeV energy can be obtained over centimeter acceleration in gas plasma with the optical laser. Laser wakefield theory shows that for a given laser the energy gain is inversely proportional to the plasma density and low density implies a much longer acceleration length, which means the scheme of ultrahigh energy gain wakes the acceleration length longer. The recent proposed generation of the X-ray laser pulse provides us an attractive way to get ultrahigh energy [2]. Due to the much higher critical density for the X-ray laser pulse, solid density materials can be chosen, which causes stronger wakefield and ultrahigh energy gain with a compact structure [3]. Motivated by this, we explore the X-ray wakefield accelerator in a nanotube and get the scalings of acceleration.

[1] T. Tajima, J.M. Dawson, Phys. Rev. Lett. **43**, 267 (1979).
[2] G. Mourou, et al., Eur. Phys. J. **223**, 1181 (2014).
[3] T. Tajima, Eur. Phys. J. **223**, 1037 (2014).

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